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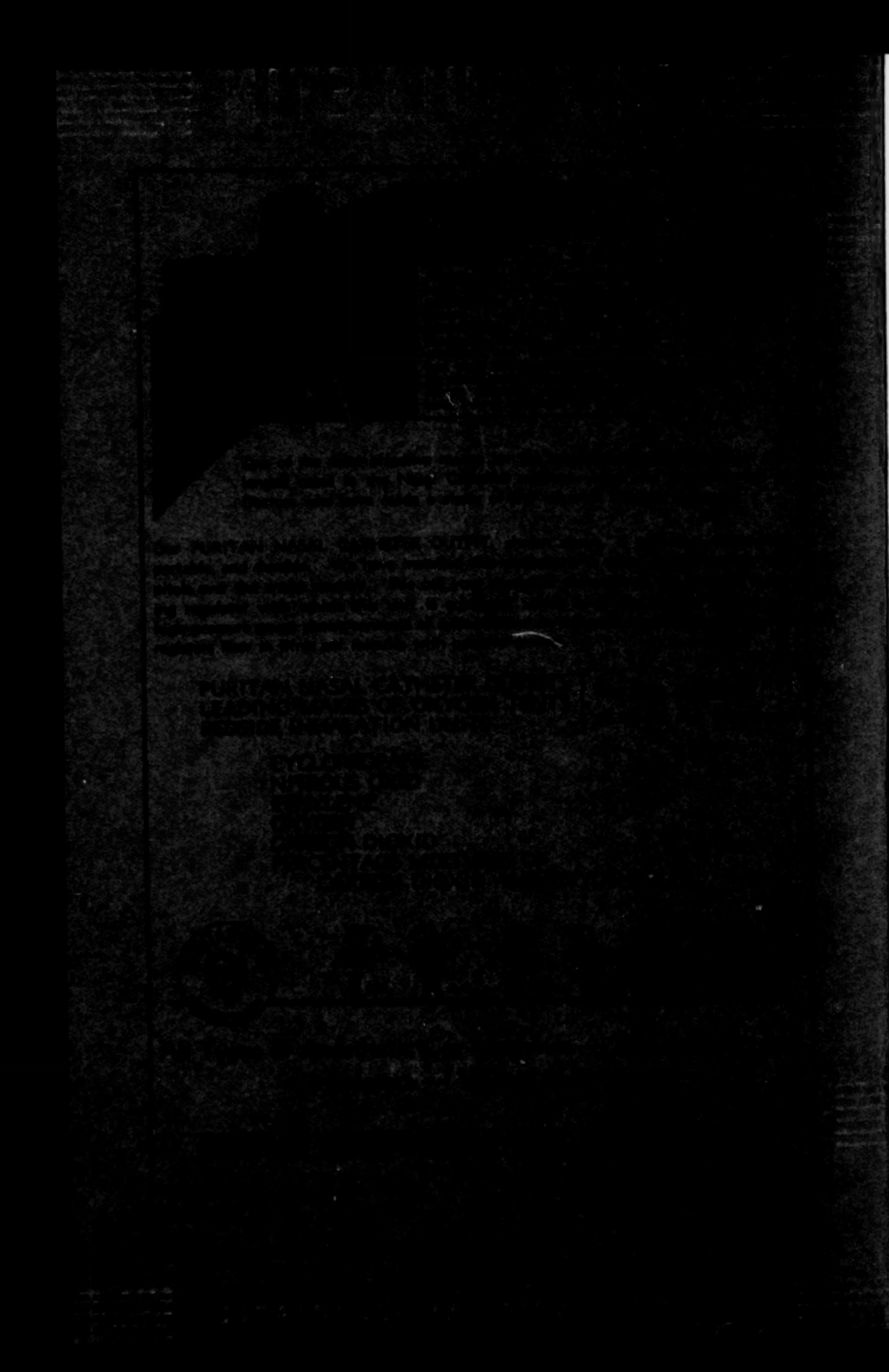

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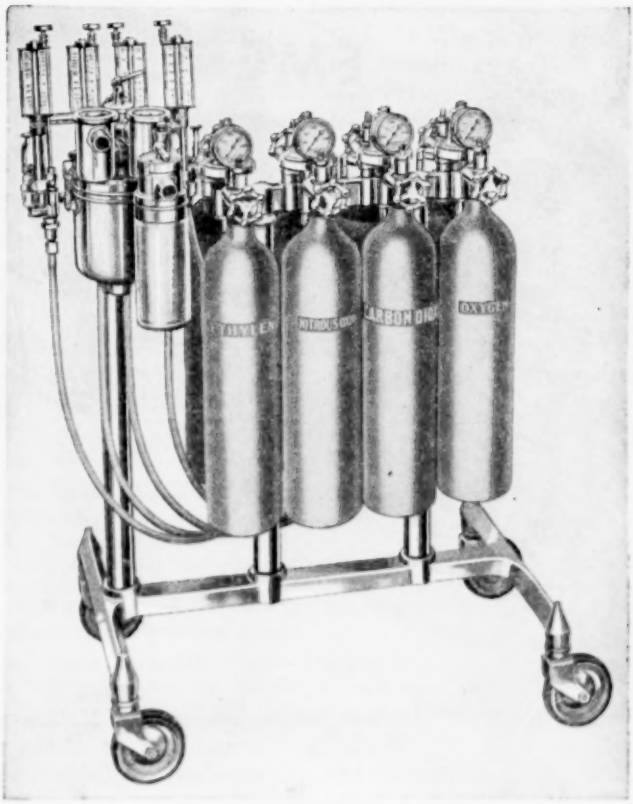

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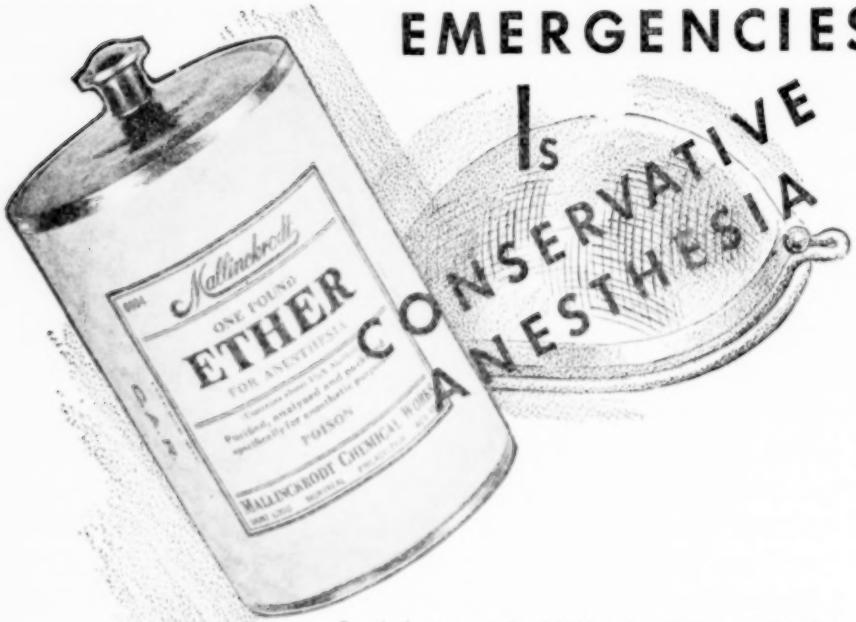

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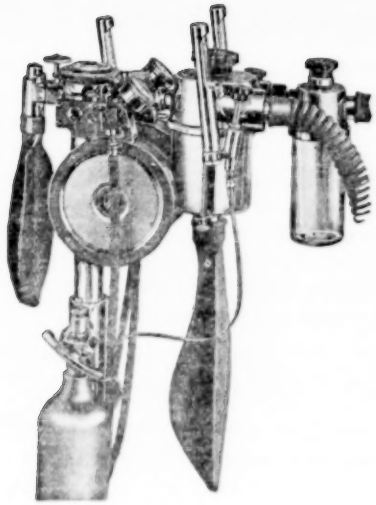

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The Bulletin of the National Association of Nurse Anesthetists

VOLUME 5, NO. 1 FEBRUARY, 1937

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ANESTHESIA IN GYNECOLOGY

JAMES E. KING, M.D.*

Professor of Gynecology, University of Buffalo

An experience of thirty-five years in surgery of women has given the writer definite convictions in regard to anesthesia. During this period of thirty-five years, a number of drugs and methods of anesthesia have been tried in the hope that some one of them would answer all four of the chief requirements. These requirements are: first, safety to the patient; second, an anesthesia that makes possible efficient, safe work by the surgeon; third, one that removes as completely as possible unpleasant after-effects; and finally, one that will dispel the fear and unpleasantness incident to its induction.

The anesthetic has always been the chief dread of any operation. The thought of passing into oblivion has attached to it a fear which cannot be entirely overcome. There are several factors which contribute to this. One not to be ignored is the trip to the operating room. The patient is lifted from her bed to the cart, which in itself contributes to her fear. She is wheeled to the floor of the operating rooms, usually before the patient who has preceded her is taken down. She is placed in an adjoining room while the operating room is being prepared. She is conscious of the attending bustle, hears the instruments being cleaned and arranged, and she realizes that this is all for her. She is then taken to the operating room and either lifted or requested to move herself upon the table. While doing this she sees about her a group of nurses and doctors in curious, unfamiliar garb, and she also often sees the instrument table with its array of instruments. All these unusual sights and sounds increase her fear, and by the time the anesthetist places the mask over her face, she is at a nervous tension which interferes with peaceful resignation to the anesthetic. The desirability of obviating this state of mind is indicated by the pre-anesthetic hypodermic of morphine or scopolamine, which is usually employed. With the advent of the barbital combinations, these drugs in some form have been substituted for or added to the preliminary morphine. While occasionally these aid greatly in quieting the fear of anesthesia, in the majority of women, the memory of their experience still lingers to constitute the greatest fear of a future surgical procedure.

Ether has always been considered the safest anesthetic. In the writer's experience, however, post-operative complications directly traceable to it were very much more common than is seen today in the use of other anesthetics. The improvements in ether administration today, have, of course, reduced these complications. Ether anesthesia is to the majority of patients an extremely unpleasant experience. A nitrous oxide induction followed by the drop ether method has eliminated some of the unpleasantness of the first stage, but it has done little to dispense with the nausea, vomiting, gas pains and the possible pulmonary sequelae that follow ether anesthesia.

With nitrous oxide anesthesia, the writer hoped to eliminate much of the dread of surgery. While nitrous oxide

* Read at the third annual meeting of the New York State Association of Nurse Anesthetists, held in Buffalo, May 21st and 22nd, 1936.

eliminated much of the unpleasantness of induction compared to ether, there were a number of features from the surgeon's viewpoint that were still undesirable. The cyanosis with increased bleeding, the difficulty in securing relaxation, or the necessity and difficulty of operating with insufficient relaxation, presented in laparotomies real objections to this form of anesthesia. It is true that it is a great satisfaction to see one's patient quickly regain consciousness, but vomiting and post-operative gas pains were only in a measure decreased. The writer used this form of anesthesia for twenty years—largely because of the somewhat greater comfort to the patient. Still it was not the ideal anesthetic. In a certain percentage of cases, it became necessary to add ether to the gas or to substitute drop ether. One of the most disappointing features of nitrous oxide is the fact that in the majority of cases the anesthetic was still remembered by women as the most unpleasant feature of their operations.

During this period, the writer tried spinal anesthesia. Women objected to it, and quite naturally. The thought of a spinal puncture, in addition to the distress of the trip to the operating room, was quite sufficient to disturb to a greater degree their mental equilibrium. From the surgeon's viewpoint, spinal anesthesia is ideal. In the writer's opinion, however, it is not an entirely safe anesthetic—the sudden drop in blood pressure and the occasional vomiting during the operation as a result, added other objections. In addition to this, the fact that the patient was conscious during the operation was always distressing. Certainly the majority of women do not like spinal anesthesia, and some will make so bold as to request that it be not used.

About seven years ago, avertin began to receive attention in this country. The writer tried it in the hope that it would meet both the requirements of the patients and the surgeon. At that time but few clinical reports of its use were available. The booklet supplied by the manufacturer seemed to furnish the most reliable data for its employment. For six years it has been used in practically every case operated upon in the gynecological service of the Buffalo General Hospital. The writer himself has used it in approximately 2,600 cases. Records were kept in the first 1,500 cases, and from these the writer has evolved certain definite views of his own regarding its use. To these established views there has since been strict adherence.

An attempt was made at first to use avertin alone as the anesthetic. Ninety to one hundred milligrams were used in laparotomies and sixty to eighty in the minor operative procedures. The preliminary hypodermic in the early cases was a quarter grain of morphine, given one-half hour preceding the administration of the avertin. This dosage was soon reduced to one-sixth grain of morphine, as the larger dose depressed the respiration to a point which, upon the addition of the avertin, produced, in a certain number of cases, a very shallow respiration. Certain patients were given no hypodermic. Some of these were found to expel the avertin, and often the patient did not sink into sleep as promptly. One-sixth grain of morphine is now maintained as routine. The writer has never used amytal or similar drugs as preliminary medication.

Early in the first 1,000 cases, it was found that avertin in the eighty-to-one-hundred dosage possessed two disadvantages: depression of the res-

piration and lowering of the blood pressure. Much less frequently, also, it slowed and depressed the circulation. A number of the earlier cases caused some alarm, but it was found that a hypodermic of ephedrin soon improved the respiration and raised the blood pressure. In some cases the respiration became very shallow, with a lowered blood pressure reflected in the pulse. These patients declared their condition by the pale, somewhat pasty countenance they presented. In the use of the ninety-to-one-hundred milligram dosage, the blood pressure drop always occurred. Avertin in women with high blood pressure (180/200) would at times show a fall of fifty points, and in several cases a drop of ninety was noted. Such experiences soon led the writer never to give a patient with high blood pressure a larger dose than sixty to seventy milligrams. Even with this dosage a fall of twenty-five to forty points in the blood pressure is not uncommon. It, however, usually produces no alarming symptoms.

In most of the patients, even with the larger dosage, it was found that supplementary nitrous oxide was often necessary. The quantity required to supplement the avertin to afford complete relaxation was so small that it resulted in none of the disadvantages of nitrous oxide alone. It was not only the disadvantage of the large dose of avertin, but also the fact that with a smaller dose, only a small amount of nitrous oxide was required for satisfactory relaxation. This prompted the writer to abandon the ninety-to-one-hundred milligram dose of avertin and use the sixty-to-seventy-milligram dosage only as a basal anesthetic, which was to be supplemented by nitrous oxide. This has worked out so satisfactorily that, for the last 1,000 anesthetics, it has been the rule in all cases. It is seldom now that ephedrin is given, and the worry of both the surgeon and the anesthetist is removed. Rarely ether is used in place of the gas, but when it is used the amount required is negligible.

There was one death occurring in the 2,600 anesthesias, that could be in any way ascribed to avertin. One woman died of an anoxemia twelve days following a laparotomy. This was proved by autopsy. The patient was left by the anesthetist as the abdomen was about to be closed, and the anesthetic was intrusted to an interne, who continued to ply the patient with nitrous oxide.

Avertin has been used in almost every type of constitutional complication. Anemia, heart and kidney conditions and prolonged suppurations do well with the small dosage. The writer has also used it in small dosage in marked jaundice, with no ill effect.

Advantages in the use of avertin have been most pronounced. Patients no longer dread the anesthetic. This, in the writer's work, is a great advantage, as many of his cases are radium treatments, with a subsequent treatment three or four months later. These women have no fear of the anesthetic and are enthusiastic in their statements as to the ease and comfort with which they go to sleep. After being put back to bed they sleep for several hours. As soon as they awaken or become restless, a hypodermic of morphine, 1/6 or 1/4 grain, makes them again comfortable. Emesis, except that due to post-operative complications, is rarely seen to a degree that really disturbs the patient. So-called gas pains, with abdominal distention, are no longer the dread of patients and surgeon. The convalescence from laparotomies today is

vastly less unpleasant than in the days of ether anesthesia.

In the 2,600 anesthesias, massive collapse of the lung has been observed twice. The last case died thirty hours after the operation, with a most extreme degree of bilateral lung involvment. Autopsy showed both lungs so extensively involved that no possible treatment would have been of value. No rectal complications have been seen.

Quite naturally one may now ask whether avertin answers the requirement of the writer for an anesthetic for gynecological work. In general, it may be answered in the affirmative.

The first requirement is safety to the patient. The writer is confident that in the smaller dosage used as a basal anesthetic it is safe; just as safe, certainly as the barbital compounds used as pre-anesthetic medication. It has been used in various constitutional conditions with relative safety, where anesthesia by gas or ether would carry considerable danger. All of the post-operative complications have been found less frequently following avertin than following other anesthetics.

OBSTETRICAL ANALGESIA AND ANESTHESIA

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Women of today demand that something be done to alleviate the pains of labor. Labor-saving devices which are a part of our every day life have conspired to make the modern mother less well equipped for the function of childbirth than women of a few generations ago. It is a well-known fact that the nervous system is more acutely affected by pain in women who have lived a life of comparative ease, therefore the obstetrician of today is called upon to relieve the suffering of women of more complex nervous sensibilities than were the attendants of yesterday.

Modern obstetrical technic demands that women be delivered in well regulated maternities which may or may not be a part of large general hospitals. Team work is developed which was totally unknown in years gone by, in which the nursing staff and resident medical staff are employed under the direction of the obstetrician. By this I mean that the patient entering a modern hospital for maternity care has received adequate ante-partum supervision by the physician and nurse and when once admitted to the hospital submits to the care of a specially trained personnel.

The delivery nurses and obstetrical anesthetists acquire an almost uncanny sense, through experience, which enables them to know at a glance whether a certain patient is making rapid progress or is one that may require attention of a special nature. Nurse anesthetists who have

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* Read at fourth annual meeting of the National Association of Nurse Anesthetists, Cleveland, Ohio, October 1, 1936.

had special training in obstetrics are of inestimable value in the care of our patients.

Various methods are used to lessen the pain of labor, it being the function of the attending obstetrician to outline the method to be used for each individual case. There can be a routine method of preparing the patients but there never should be a routine method of pain relief adaptable to all patients. In other words, the administration of drugs for the relief of pain should be highly individualized.

It has been pointed out by many observers that there is not only physiological injury in childbirth but without doubt there is a psychological injury. This can be overcome in a great measure by the judicious use of suitable sedatives to the nervous system, given during the progress of labor.

It has been thought by many obstetricians in the past twenty years that relief from the suffering of labor is vastly beneficial to the mother, provided that the progress of labor was not too greatly retarded. For that reason methods which produced a loss of sensibility to pain with or without loss of consciousness are ideal. That is the definition of obstetrical analgesia. If analgesia carries with it the loss of memory it involves a state known as amnesia.

The fact that there are so many methods now at hand for producing obstetrical analgesia proves the fact that the problem has yet been but partially solved. There are good reasons for objections to the use of practically every type of analgesia, which emphasizes the importance of mature judgment if they are to be employed. Many of the materials used for the production of analgesia can be carried to the point of producing anesthesia. There are four methods by which analgesia is administered:

1. By mouth
2. By hypodermic
3. By rectum
4. By inhalation

By Mouth

First we will consider those that are given by mouth. They are principally barbituric acid derivatives, and the manufacturers have vied one with another in the past few years in the manufacture of these products. Two of them have stood the test of experience and are now widely used. These, using the trade names, are: sodium amytal and nembutal. Others commonly used are: amytal, dial, sodium alurate, phenobarbital (luminal), barbital, neomal, et cetera. Rarely, a patient has an idiosyncrasy for barbiturates, and if so she will show signs of poisoning when such is encountered. Ephedrin and caffein sodium benzoate plus oxygen should then be given to the mother.

Irving and others have recently reported a large series of deliveries at the Boston Lying-In Hospital under an analgesia consisting of nembutal and scopolamin. The patient is given 7½ grains of nembutal by mouth, when the labor is established and the cervix begins to show some evidence of effacement. Together with this she is given $\frac{1}{150}$ grain of scopolamin. If the patient weighs more than 160 pounds she is given 9 grains of nembutal and $\frac{1}{100}$ grain of scopolamin. Twenty minutes after this administration she is given 30 grains of sodium bicarbonate by mouth. The rationale of this procedure is to decrease the hydrogen ion concentration of the accumulated highly acidic stomach contents present at the start of labor, which is probably the result of such emotions as fear, pain, anxiety, et

cetera. When it becomes necessary to give more of the drug a 1½ grain capsule of nembutal is perforated at both ends, then placed well up in the rectum. This may be repeated every two or three hours, but the scopolamin is not repeated. If unusual restlessness occurs, rectal ether may be added. General anesthesia is added when the patient is in second stage.

Contraindications for the use of this method are:

1. Any poor anesthetic risk
2. Acute liver damage
3. Heart disease with decompensation
4. Acute pulmonary disease

We have had equally satisfactory results in dealing with multiparae, by giving 9 grains of sodium amytal after the usual preparation, followed by the administration of 6 grains more when necessary; second dose being given by rectum is considered advisable. The comparatively short time required for the dilatation of most multiparae has caused us to feel free to give nitrous oxide or ether analgesia as the labor progresses. We have been using this method for the past eight years with satisfactory results. It is my personal opinion that any delay in breathing on the part of the baby has been in direct proportion to the amount of ether which may have been given. The occasional patient reacts to the administration of barbiturates by becoming extremely excited. If that happens the administration of the drug must be discontinued.

In England chloroform capsules have been used, and even administered by midwives, for analgesia. Rees has reported 100 unselected cases in which they were given in the second stage with good results. He does not advocate their use except under the supervision of the physician.

By Hypodermic

Various agents are given hypodermically for the control of pain, the most widely known being opium derivatives, chiefly morphine sulphate. To this may be added scopolamin (hyoscin).

Pernocton, a barbiturate, has been used to obtain analgesia, given intravenously similarly to the administration of evipal and other intravenous methods of anesthesia. Very few of us in this country have had very much experience in its use. At the Cleveland Maternity Hospital we have been using morphine and scopolamin to obtain analgesia in primiparae for the past twenty-five years. Sixteen thousand and eighteen primiparae have been delivered in the past eighteen years. The customary method of administration is: ⅙ grain of morphine and 1/150 grain of scopolamin when the labor is well established, repeating the scopolamin 1/200 in 45 minutes, then 1/400 in 45 minutes, then 1/400 every 1½ hours thereafter, repeating the morphine if necessary so that the patient is completely comfortable. The amnesia which these patients experience is very gratifying and there is very little, if any, slowing of the progress of labor. Near the end of the first stage of labor, rectal ether or rectal sodium amytal is administered, followed by nitrous oxide or ether analgesia, gradually carried to the point of actual anesthesia. It is customary not to give morphine or scopolamine within three hours of the time of delivery because of its depressant action upon the respiratory center of the baby.

Objections

1. The treatment requires specially trained personnel.

2. It causes excitement in some patients.

3. It may depress the respiratory center in the infant, so that artificial respiration is more often necessary.

By Rectum

The best known method of rectal analgesia is the Gwathmey technic, with which all are well acquainted. As soon as the patient is definitely in labor she is given ¼ grain morphine with 2 cc. of saturated solution of magnesium sulphate; 30 minutes later there is instilled into the rectum a solution of 2 ounces of ether in 4 ounces of olive oil, to which quinine may or may not be added. Care is taken to be sure the rectal tube is inserted well above the presenting part; that the solution is given slowly between pains; and that pressure is made over the perineum for 20 or 30 minutes after the injection is given. Objection has been raised to the use of morphine in this method, particularly if the labor is a short one, and especially since some method of general anesthesia usually is required to supplement it. A certain amount of irritation of the rectum accompanies the instillation of ether. Various barbiturates are sometimes combined with ether or oil, overcoming the objection to morphine.

Paraldehyde has recently been used to some extent to accomplish the same purpose; it is sometimes combined with the oral administration of nembutal. The patient is given 4½ grains of the latter followed in 15 minutes by 3 grains more and 20 minutes later is given a rectal instillation of 6 drams of paraldehyde.

Rosenthal, Davidoff, Kane and others have reported a large series of patients, in which the use of paraldehyde has been very satisfactory. They make the following deductions:

1. Production of prolonged amnesia and analgesia
2. Freedom of danger to mother or fetus
3. Reduction of excitation to a minimum
4. Avoidance of delay in labor
5. Simplicity of administration

Some observers have noticed a high incidence of excitement in these patients. Other methods of rectal instillation for the same purpose are the various barbiturates, and chloral hydrate, and the German literature has recently mentioned rectidon, still another barbiturate, which is administered rectally by means of a suppository or enema.

By Inhalation

Foremost in this field is ether. Then in the approximate order of their frequency: nitrous oxide plus oxygen, chloroform, ethylene, ethyl chloride, and, more recently, cyclopropane.

Dodek has demonstrated graphically by means of the external hysterograph that:

1. Ether as an analgesic has no effect upon the progress of labor when given during contractions.

2. Nitrous oxide-oxygen as an analgesic has either no effect upon the severity of the contractions, or may in some instances actually increase or stimulate them.

3. Spinal anesthesia depresses the frequency and intensity; however, there is increased tonicity of the uterus. Its effect usually lasts for about 1½ hours.

4. Morphine has been said to hasten labor, in others it has no effect, and in a third group the labor may be retarded. However, as a rule, when given in moderate dosage to a patient in active labor there is little or no effect upon the strength of the uterine contractions.

5. Morphine sulphate plus scopolamin has the same effect, plus the amnesia usually obtained by the addition of scopolamin.

6. Ether-oil colonic analgesia (Gwathmey) if combined with quinine gives a negligible diminution in intensity and frequency at the onset, but after about 20 minutes the contractions are as before the treatment. Without the addition of quinine analgesia is present, at times complete anesthesia, no latent period being present in its activity.

7. Avertin in a 60 milligram dose has no effect other than to prolong the interval between contractions. The effect of the drug is shown to wear off in 45 to 50 minutes.

8. Sodium amytal, as well as other barbiturates, can be used safely in multiparae; they have no effect upon the contractions and do not depress the respiratory center in the baby. They occasionally excite the patient, as is well known, and for that reason cannot be given routinely.

ANESTHESIA MAY BE:

I By mouth in those cases which are susceptible to barbiturates.

II By morphine and also by various barbiturates intravenously:
- Evipal
- Pernocton
- Spinal anesthesia with 1 or 2 per cent novocaine
- Local perineal block
- Sacral anesthesia

III Anesthesia by rectum is completed by the use of ether in oil in some cases; avertin, paraldehyde, and the various barbiturates.

IV Anesthesia by inhalation is accomplished by increasing the amount of anesthetic material which one would give for analgesia and includes the same materials.

I wish to emphasize that no patient should be given a general anesthetic, even "just for the delivery of the baby," unless she is in condition to be given an anesthetic. The patient should not have a stomach full of food and an anesthetic should not be administered if she has a cold. She should be prepared for the delivery just as though she were to have a surgical operation. I think the above points are lost sight of too many times. So often the anesthetic for the purpose of delivering a baby is in the hands of inexperienced people and is not given properly.

Another thing that is important is the fluid balance. I have seen patients who have not been given enough fluid, so that after delivery they run a fever from dehydration. I think it is very important to watch the above factors.

OUTLINE OF ANALGESIA AND ANESTHESIA

METHODS OF PRODUCING ANALGESIA

I By mouth

II By hypodermic

III By rectum

IV By inhalation

I By Mouth
- Barbiturates
  - Sodium Amytal
  - Amytal
  - Nembutal
  - Dial
  - Alurate
  - Luminal
  - Barbital
  - Neonal

II By Hypodermic
- Morphine
- Scopolamine
- Barbiturates

III By Rectum
- Sodium Amytal and other Barbiturates
- Ether plus quinine plus oil

Ether plus oil
Chloral
Rectidon (German barbiturate)
Paraldehyde

IV By Inhalation
Ether
Nitrous oxide plus oxygen
Ethyl chloride
Chloroform
Ethylene
Cyclopropane
Chloroform capsules

METHODS OF PRODUCING ANESTHESIA

I By Mouth
Barbiturates
(The anesthetic power of barbiturates is variable)

II By Hypodermic
Morphine (sometimes)
Sodium Amytal (intravenously)
Evipal
Spinal anesthesia
Local perineal block
Sacral anesthesia
Pernocton

III By Rectum
Ether in Oil
Chloral
Avertin
Paraldehyde
Barbiturates

IV By Inhalation
Ether
Nitrous oxide plus oxygen
Chloroform
Ethylene
Ethyl chloride
Cyclopropane

CONCLUSIONS

It is readily seen that there are many agents available which can be used for obstetrical analgesia and anesthesia. There is a strong tendency to lessen the use of morphine, although scopolamin is still a valuable adjunct. It is being used in conjunction with barbiturates, particularly nembutal, with very satisfactory results.

The choice of methods used is in the hands of the obstetrician and there should be no hard and fast rules as to what agencies are employed. The thoughtful obstetrician will utilize the method best suited to the individual patient so as to obtain the maximum amount of relief of the mother and the greatest degree of safety to both the mother and child.

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From the Department of Obstetrics and Gynecology, Western Reserve University and Maternity Hospital.

A BRIEF REVIEW OF ANESTHETIC AGENTS, INCLUDING CYCLOPROPANE

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Progress in the development of anesthesia, like that in other branches of medical science, during the past three-quarters century has been made in ever-increasing ratio. The discovery of each new anesthetic agent has given added impetus to the search for a drug which would fulfill all the requirements of safety and comfort for the patient during and after the operative procedure, while affording the surgeon adequate facility in the performance of his work. To this end, chemists, inventors, manufacturers, surgeons, and anesthetists have labored untiringly, and for their combined accomplishments we owe them a priceless and increasing debt.

History tells us that for thousands of years man has attempted to lessen pain by the use of drugs which would induce insensibility. In Homer's "Odyssey," Helen of Troy poured some drug, probably mandragora or opium, into wine to "lull all pain and anger, and bring forgetfulness of every sorrow." At the beginning of the Christian era mandragora was well known; Roman historians recorded that it was used extensively to relieve the suffering of crucifixion.

Much later, in the thirteenth century, an opiate consisting of hyoscyamus, and the juices of unripe mulberry, hemlock, and other plants were prepared by Huga de Lucca and administered with success. Throughout the pages of the history of the middle ages are references to the use of potions devised to produce sleep and surcease from pain. The possible application of chemical compounds for these purposes seems not to have been thought of until the beginning of the nineteenth century.

Thus it was many years after the discovery of oxygen and nitrous oxide by Priestley in 1744, of hydrogen by Cavendish in 1766, and of nitrogen by Rutherford in 1772, that the practice of surgical anesthesia began. The first recorded attempt in this direction was made by Sir Humphrey Davey, who in 1800 used nitrous oxide for relief of pain during the extraction of his own wisdom teeth. He also found it effective in alleviating headache. His success in these respects led him to make the prediction, "Since nitrous oxide seems capable of destroying physical pain, it may be used in surgical operations where there is no great effusion of blood."

Between the years of 1820 and 1828 Henry Hill Hickman devoted extensive study to the means of producing unconsciousness during surgical operations, first with carbon dioxide and later with nitrous oxide. Although he failed to interest the professional group, he deserves much credit for his work in this field. Andrews of Chicago demonstrated the use of nitrous oxide with oxygen, in 1868. His achievements, however, like those of Hickman, were not accorded proper recognition. A few years later, Paul Bert of France, at last succeeded in arousing the active interest of the medical world in nitrous oxide and oxygen, for producing anesthesia in surgical procedures. Hillischer of Vienna subsequently administered these gases successfully by the use of

a machine, and Hewitt of England later developed the method of administration in use at the present time.

Chloroform, the anesthetic properties of which were discovered by Flourens in 1847, for a time was received with acclaim. However, the fatalities which followed its administration soon caused it to be used with caution and it was never generally accepted.

The chemical compound ether was discovered in 1540 by Valerius Cardus, a young Prussian botanist. In medicine, it was first used by Rutherford in the treatment of asthma, in 1772. Faraday, in 1818, recognized the value of sulphuric ether as an anesthetic agent, but Crawford Long is accredited with its original application for an operation in 1842. Long was so well pleased with the results that he continued to use ether in his own practice, but, being a country doctor, his surgical cases were few and his fame did not go beyond a restricted area. It remained for Morton to place ether upon a popular basis. Following his notable demonstration in the Massachusetts General Hospital in 1846, ether became the choice of anesthetic drugs and is still widely employed in many sections of the country.

In any discussion of anesthetics, the work of John Snow, in 1858, and later of J. T. Clover, should not be overlooked. These investigators, through studies on animals, demonstrated the physiological effects of various percentages of ether and other narcotic drugs. Clover also pointed out the advantages of the closed method of air limitation, and introduced the nitrous oxide-ether sequence.

The success of ether was a great stimulant to interest in anesthesia. Extensive research was begun for the purpose of discovering and purifying new agents and inventing better methods of administration, and further experiments were made to determine the effects of different drugs upon the respiratory, circulatory, nervous, muscular, and glandular systems. Several years elapsed, however, before an agent superior to ether was found.

In 1918, Luckhardt and Thompson took up the investigation of ethylene, upon which some research had been carried out thirty years earlier. The war interrupted their progress, and it was not until 1923 that they perfected ethylene for clinical application. Its effects were then demonstrated before a group of surgeons, internists, and professional anesthetists, all of whom were so well pleased with the rapid action of the agent, the relaxation, and the early recovery of the patient which it permitted, that it was adopted immediately by the Presbyterian Hospital of Chicago, and it was there that the first 106 operations performed under ethylene anesthesia took place.

From that time to the present day ethylene has enjoyed a popularity equalled by no other drug. This, of course, is because of its advantages over those hitherto discovered, chief of which are: (1) anesthesia is easily induced and consciousness quickly regained; (2) relaxation is promoted without cyanosis, (3) the respiratory tract is not irritated, and (4) a narrow margin of anesthesia is afforded.

In common with other anesthetic drugs, on the other hand, ethylene has some disadvantages: (1) it has an objectionable odor, (2) it is highly inflammable, and (3) it affords inadequate relaxation for abdominal operations.

With the development of ethylene began the most enlightened era in the history of anesthesia. Realizing what

might be achieved, leaders in surgery and medicine became even more exacting in their demands for an agent which would reduce to a minimum operative and post-operative complications, yet permit the surgeon freedom in carrying out his work. Endeavoring to meet these demands, a host of investigators have within recent years perfected a drug which, more completely than any other, offers the patient ease and safety during and after the trying ordeal of surgery and at the same time affords ample relaxation for the benefit of the surgeon, and thus closely approaches the ideal anesthetic so long sought. This drug is cyclopropane.

Freund, in 1882, conducted the first experiments with cyclopropane, which technically is trimethylene. Thereafter, judging by the literature, no investigations were carried out with the drug until Henderson and Lucas became interested in its anesthetic properties. The results of their preliminary work, which was limited to experiments on animals, were published in 1929. Waters, Rovenstine, and their associates continued experiments with cyclopropane on animals and extended their studies to humans, and, after further investigation, Dr. Waters and his co-workers demonstrated the clinical application of the agent.

Cyclopropane is a colorless gas, its chemical formula C_3H_6. It is heavier than air, having a specific gravity of 1.46, liquifies at a pressure of 75 pounds per square inch at room temperature, and is definitely inflammable and highly explosive. Cyclopropane has a pungent but not unpleasant odor, and hence is not disagreeable to inhale. It is usually administered in a ratio of 10 or 15 per cent to 85 or 90 per cent of oxygen, and this abundance of oxygen permits rapid induction, eliminates the vagaries which so often accompany other anesthetic drugs, and brings about a more rapid return of consciousness. The patient's color is maintained and the skin remains dry and warm; thus fluids are conserved, the body heat is more nearly normal, and in turn the danger of shock is reduced. Further, the air passages are not irritated and respiration is not stimulated. These features are especially valuable in operations upon the chest; also, they tend to prevent the development of post-operative pulmonary complications. In addition, we have learned from Bourne that liver and kidney functions are not impaired, and from Seevers that the heart is not affected by the use of cyclopropane. According to the studies of Waters and Schmidt, patients sometimes undergo blood chemistry changes, although this is only a temporary condition. Coagulation time is not altered. In our experience, patients have suffered with less nausea, vomiting and headache, and chest complications have been fewer following operations performed under cyclopropane anesthesia. From the standpoint of the surgeon, cyclopropane is desirable in that it affords better relaxation than ethylene, in this respect being equal to ether in the majority of cases. It is worth mentioning, also, that cyclopropane is extremely inexpensive. The cost of the average anesthetic is approximately 65 cents.

We have not found that cyclopropane has any disadvantages. However, its inflammability should be borne in mind and adequate precautions exercised to eliminate sources of ignition during its administration. The cautery and diathermy machine should never be used at this time. If ordinary care is taken in these matters, the danger of explosion of cyclopropane may be considered negligible.

As to the most suitable premedication, opinions vary. In our cases ⅙ grain of pantopon given two hours before operation, and ⅙ grain of pantopon with 1/150 grain of atropin one hour before operation has been found adequate. Synergistic drugs, which have a depressing effect, are contraindicated. Cyclopropane is not a respiratory stimulant.

The soda-lime absorption technique of administration has been followed in our series of cases. Much has been written about the advantages of this method since Jackson and Mann reported the outcome of their experiments in 1916. It restricts the dissemination of anesthetic gases and vapors in the operating room, and so reduces to a minimum the hazards of fire and explosion. This technique also provides another means of conserving the body heat and moisture, which are lost through inhalation with other methods.

Technique.—The breathing bag is filled to three-fourths its capacity with oxygen, the mask is placed on the patient's face, and he is allowed to inhale three or four breaths of oxygen. Cyclopropane is then introduced at the rate of 300 c.c. during the first minute, 400 c.c. the second minute, and 500 to 600 c.c. during the third and fourth minutes, or as long as necessary to obtain the proper stage of anesthesia. At the same time, oxygen is added at the rate of 300 to 500 c.c. per minute, according to the patient's metabolic needs. In giving cyclopropane, one must remember that high concentrations are not merely unnecessary, but are distinctly harmful.

By the time the patient is fully prepared, which as a rule requires three to five minutes, the patient should be in surgical anesthesia, and when this stage is reached the soda-lime filter is turned on. If at any time during operation anesthesia becomes light, cyclopropane is added at the rate of 500 or 600 c.c. per minute. This is generally required in longer operative procedures because of the unavoidable leaks.

We have found that the patient's blood pressure rises with induction but, in the usual case, returns to its normal level as anesthesia progresses. The pulse varies with the depth of anesthesia; a very fast or very slow pulse will indicate the limit of tolerance.

Cyclopropane as an adjunct to other drugs may be employed without hesitancy. On several occasions we have found it necessary to give carbon dioxide and even a small amount of ether to stimulate respiration. These patients had received excessive medication the night before or were emergency cases that had been given large doses of narcotics before entering the hospital. We have also combined ether with cyclopropane in a few cases to obtain better relaxation. In more than half our cases we have thought it advisable to use the airway in order to obviate the possibility of obstruction of the air passages.

If it becomes necessary to apply the cautery, nitrous oxide is given until this part of the procedure is completed. The breathing bag is then emptied and filled with oxygen, and the usual technique followed with cyclopropane.

A review of the literature shows us that other writers on the subject have also reported fewer complications following the administration of cyclopropane than with any other drug. In considering post-operative complications, we believe that not only the anesthetic agent, but other factors as

well should be taken into account as contributory causes, as, for example, the extent of the disease process, the type and duration of the operation, and the amount of hemorrhage. In order that the results in our 350 cases may be more accurately appreciated, we are mentioning these points in the following brief reports.

TABLE I

TYPES OF OPERATIONS

Upper Abdomen:	
Stomach	12
Gallbladder and ducts	38
Liver	1
Spleen	1
Lower Abdomen:	
Colon	10
Appendix	103
Rectum	5
Pelvis:	
Uterus	46
Tubes and ovaries	7
Shortening ligaments	3
Vaginal hysterectomy	3
Perineum	8
Cervix	5
Dilatation, curettage and radium	16
Dilatation and curettage	2
Abscess cul-de-sac	5
Thyroid and Parathyroid	20
Breasts:	
Amputations	6
Resection tumors	6
Chest (rib resection)	1
Genito-urinary Tract:	
Kidney	2
Hydrocele	1
Miscellaneous:	
Superficial abscesses	11
Superficial cysts and tumors	5
Superficial wounds	6
Skin lesions	3
Bone infections	2
Amputations (foot, thumb)	2
Abdominal explorations	6
Herniorrhaphies	14

TABLE II

COMPLICATIONS

Shock	6
Pneumonia	3
Post-operative psychosis	1
Kidney dysfunction	1
Lung collapse	1

A brief report of the cases included in the above table follows:

Case 1. Woman, aged 32 years. Operation: Dilatation and curettage, shortening of ligaments, and appendectomy. The patient had previously had several sinking spells at home, which were believed to be vascular collapses. One hour and a half after operation she went into collapse and her blood pressure fell to 60/0. She was revived by intravenous medication and blood tranfusion.

Case 2. Woman, aged 60 years. Operation: Radical amputation of the breast. The patient was in poor general health. Her blood pressure was 240 at the beginning of the operation; it gradually fell to 60, and hemorrhage was excessive. Intravenous medication and blood transfusion served to elevate the blood pressure and improve her condition.

Case 3. Woman, aged 68. Operation: Closure of intestinal fistula, appendectomy, and repair of abdominal wall following operation for drainage of abdominal abscess secondary to perforated appendix with disruption of infected wound. The patient's blood pressure fell to zero at the conclusion of the operation, but intravenous medication and blood transfusion restored her to good condition.

Case 4. Man, aged 55 years. Operation: Appendectomy. Appendix gangrenous, with local peritonitis. The patient was obese and in poor physical condition. He developed post-operative bronchial pneumonia and a sudden suppression of urine.

Diathermy, intravenous fluids, and the oxygen tent relieved these conditions.

Case 5. Woman, aged 38. Operation: Amputation of the cervix, perineorrhaphy, subtotal hysterectomy, and appendectomy. At the conclusion of operation the patient's blood pressure dropped to zero, but returned to normal after stimulation by intravenous glucose and acacia. The collapse was caused by hemorrhage from an aberrant blood vessel.

Case 6. A man, aged 60. Operation: Thyroidectomy. The patient had an extremely toxic adenoma and had previously had a psychosis. The psychosis returned following operation but continued only a few days.

Case 7. A woman, aged 58 years. Operation: Gastro-enterostomy. Five days afterward the patient developed bronchial pneumonia, which subsided under treatment by intravenous fluids, circulatory stimulants, and the use of the oxygen tent.

Case 8. A woman, aged 42. Operation: Total hysterectomy and appendectomy. At the conclusion of the operation the patient's blood pressure dropped to 80/60. Heart stimulants and intravenous glucose restored the pressure to normal.

Case 9. Man, aged 47 years. Operation: Posterior gastro-enterostomy. On the third day post-operatively the patient developed all the symptoms of lung collapse. Carbon dioxide and the oxygen tent were used; the condition began to clear up on the seventh day and recovery was rapid.

Case 10. Man, aged 37. Operation: Cholecystectomy and appendectomy. This patient entered the hospital with a slight cold. Twenty-four hours after operation the cold became worse, he developed a slight cough, and one lung was congested. The use of carbon dioxide and the oxygen tent were followed by rapid recovery.

Case 11. Woman, aged 31. Operation: Sub-total hysterectomy and unilateral oophorectomy. On the second day post-operatively the patient complained of a painful chest, she developed a cough, her temperature rose to 102 degrees, and she became cyanotic. The roentgenogram showed an infarct in the right middle lobe of the lung. The oxygen tent was employed, with subsequent recovery of the patient.

Case 12. Woman, aged 40. Operation: Disconnection of gastro-enterostomy, and cholecystectomy. During operation the patient's pulse became imperceptible and her blood pressure fell to 40/0. Glucose and acacia were given on the table, and later a blood transfusion. After a few hours her condition was satisfactory and recovery was uneventful.

TABLE III

CAUSES OF DEATH

Pneumonia	2
Kidney dysfunction	2
Peritonitis	2
Cirrhosis of liver	1
Carcinoma of stomach	1
Generalized sepsis	1

A review of each of the fatal cases follows:

Case 1. A man, aged 45. Diagnosis: Disrupted abdominal wound and post-operative intestinal obstruction secondary to a gastro-enterostomy performed elsewhere sixteen days earlier. Operation: Liberation of intestinal obstruction, disconnection of gastro-enterostomy, and resection of jejunum. The patient developed bronchial pneumonia and died five days after operation.

Case 2. Man, aged 17. Diagnosis: Penetrating wound of chest, diaphragm, and stomach. Operation: Suture of perforation of stomach.

Death occurred one week later, from general peritonitis.

Case 3. Man, aged 35. Diagnosis: Carcinoma of rectum. Operation: Abdominal exploration and permanent colostomy with first stage resection. Dysfunction of the kidneys was responsible for death, five days following operation.

Case 4. Man, aged 53 years. Diagnosis: Inoperable carcinoma of the stomach. Operation: Abdominal exploration. Patient expired on the third post-operative day, from the effects of the carcinoma.

Case 5. Boy, aged 15. Diagnosis: Rupture of appendix and generalized peritonitis; subsequently, multiple liver abscesses. Operation: Appendectomy and, later, drainage of liver abscesses. Death occurred on the sixteenth day after operation, as a result of general sepsis.

Case 6. Woman, aged 68 years. Diagnosis: Cirrhosis of the liver, partial stricture of the common duct, and right femoral hernia. Operation: Choledochectomy and herniorrhaphy. The patient died fifteen days post-operatively, from kidney dysfunction.

Case 7. Man, aged 46. Diagnosis: Gastro-jejunocolic fistula, gastro-jejunal ulcer, duodenal ulcer, and chronic cholecystitis. Operation: Disconnection of jejunum, colon and stomach, with repair of colon and jejunum; partial gastrectomy, cholecystectomy. The patient developed double lobar pneumonia and died four days after the operation.

Case 8. Woman, aged 67 years. Diagnosis: Acute, gangrenous and perforated appendix. Operation: Appendectomy. A generalized peritonitis was responsible for death, eight days after operation.

Case 9. Man, aged 55. Diagnosis: Cirrhosis of the liver and obstructive jaundice. Operation: Cholecystogastrostomy. The patient died twelve days post-operatively from the effects of the disease process in the liver.

COMMENT

Because of the added safety and comfort which cyclopropane affords the patient and, further, because of its adaptability to patients of every age and those having the mildest or most dangerous forms of disease, we feel that, if given the extensive trial it deserves, this drug will become the favorite anesthetic agent of the day.

EARLY POST-OPERATIVE COMPLICATIONS IN 450 CONSECUTIVE INGUINAL HERNIORRHAPHIES

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It is essential that a study of the variable factors in post-operative complications be made on a group of operative cases in which there is little variation in the technical procedure performed. The operations in this series were performed by members of the resident staff of Lakeside Hospital who were all in the same stage of surgical training. Except for two cases, silk was the suture material used. Statistics were obtained from a study of the hospital and dispensary records. This presentation will be lim-

ited to a consideration of the early post-operative complications which occurred in this series.

TABLE I

Complication	Total Cases	Local Infiltration Novocain	G O E Anesthesia	Duration of Operation (minutes)
Total Cases	453	103	350	87
All Pulmonary Complicat'ns	18.3%	21%	17.4%	99
Pneumonia	3.4%	3.8%	3.1%	103
Pulmonary Atelectasis	1.76%	1.9%	1.7%	115
Wound Infections	2.6%	3.9%	2.3%	109
Wound Infections (with 5 explainable omitted)	1.5%	3.9%	0.85%	

Table I compares the incidence of the various early complications in relation to the anesthetic used, and also indicates the variation in the duration of the operation to the early complications. One variable not considered is the age and physical condition of the individual patient. It must be stated that those patients who were considered to be poor operative risks usually were operated upon under local anesthesia and that all children were operated upon under general anesthesia.

Relatively little difference is noted in the incidence of pulmonary complications whether the cases were operated upon under general or local anesthesia. A patient was considered to have had a pulmonary complication if, as a minimal requirement, a statement of the presence of cough was made in the interne's progress notes. The average duration of the operation was increased in all pulmonary complications. This increase was present in those cases operated upon under local as well as general anesthesia. The prolonged depression of the cough reflex and prolonged presence of the irritating inhaled anesthetic may be significant in the case of the general anesthetic. The relationship between the duration of the operation and pulmonary complications, in those cases operated upon under local anesthesia, is difficult to determine. This difficulty only emphasizes the well established fact that the incidence of pulmonary complications is not dependent upon the type of anesthesia used. In the case of the inguinal herniorrhaphy it is reasonable to assume that the relationship between the duration of the operative procedure and the incidence of pulmonary complications indicates that the incidence of pulmonary complications will increase as the amount of surgery performed is increased.

There were two deaths in this series, both being operative cases having pulmonary complications. One occurred in a patient who developed bronchopneumonia and died on the third post-operative day. The second patient died about twelve hours after an operation which included the resection of eight inches of gangrenous intestine, and which was complicated by massive pulmonary atelectasis. The mortality for the series was 0.44 per cent.

There were twelve wound infections complicating the cases studied in this series, a percentage of 2.6. There is an appreciable increase in the incidence of wound infections in the cases operated upon under local anesthesia. The increase in duration of operating time was common to local and gas-oxygen-ether cases, and again it is

reasonable to assume that the incidence of wound infections will increase as the amount of surgery performed is increased. The difference in the incidence of wound infections is indeed impressive if we omit for statistical purposes five wound infections which can be explained. The accidental opening of the caecum in the repair of a sliding hernia, accounts for one. The accidental opening of the urinary bladder accounts for the second. In the case of an infant undergoing operation, the constant soiling of the dressings resulted in wound infection. Operating in the face of an adhesive tape rash resulted in the fourth explainable infection. The fifth occurred when a bilateral salpingectomy was performed for chronic salpingitis in the course of a bilateral herniorrhaphy. These five explainable infections occurred in cases operated under general anesthesia. Omitting these, the incidence of wound infections becomes 0.85 per cent in cases where a general anesthetic was employed and 3.9 per cent in cases where a local anesthetic was employed. The importance of these figures is apparent when it is observed that 75 per cent of all inguinal herniorrhaphies in this series complicated by wound infection and followed a year or more had recurrence of the hernia. Ostfeld, reporting in the German literature, found that there was disturbance of wound healing in 7.5 per cent of the cases done under local anesthesia, and in only 0.7 per cent of those done under general anesthesia. A review of recent literature failed to reveal other statistics making this comparison. However, a recent report from the Mayo Clinic reveals that there has been a considerable reduction in disturbance of wound healing in cases undergoing thyroidectomy under local anesthesia. This reduction is attributed to a change in the technique of infiltration whereby considerably less novocain is used, anesthesia being obtained principally by nerve block instead of by diffuse tissue infiltration. It is probable that diffuse infiltration with novocain reduces the local tissue resistance to infection.

From the above data, the following conclusions may be drawn: Added evidence is presented indicating that there is no relationship between the incidence of pulmonary complications and the type of anesthesia used. This statement might be enlarged upon to conclude that the employment of local anesthesia is no safeguard against the occurrence of pulmonary complications. The incidence of pulmonary complications is related to the duration of the operative procedure. The incidence of wound infections is greater when local anesthesia is employed than when general anesthesia is employed. Also, the incidence of wound infections is increased in those cases in which the duration of the operative procedure is increased.

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NITROUS OXIDE ANESTHESIA FOR TONSILLECTOMY AND ADENOIDECTOMY OPERATIONS

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Nitrous oxide as the anesthetic of choice for tonsillectomy and adenoidectomy operations has been used at St. Luke's Hospital in over 5,000 cases over a period of twenty years, and because of our satisfactory experience I am answering herewith a request to submit comments on the technique of administration.

Because nitrous oxide is one of the oldest anesthetic agents, and also because the reader no doubt has an intimate knowledge of this agent, it will not be necessary to go into detail in regard to the history or the physical and chemical properties of this gas. For the past twenty years nitrous oxide has been rapidly growing in favor for tonsillectomy and adenoidectomy operations; especially so, since the operation done by the Sluder technique, which was originated by Dr. Greenfield Sluder of St. Louis in 1911, has come into vogue. A longer, deeper anesthesia than that produced by nitrous oxide according to our technique is unnecessary, because of the rapidity with which the surgical procedure is accomplished.

Throughout our series of over 5,000 cases, the surgeons and myself have felt no hesitancy in using this anesthetic for the very young child, or the elderly person whom one occasionally has for this operation and who may present complications such as hypertension or myocardial change. We have had no fatal sequences and the ill effects are practically inconsiderable. We use no premedication either for the child or the adult.

The advantages of nitrous oxide-oxygen anesthesia are: It is not unpleasant to take; anesthesia is accomplished with rapidity; it is not irritating to the mucous membrane; excitement is practically eliminated because of the small amount needed; the cough reflex is maintained; because the vomiting reflex is not lost, instrumental irritation of the pharyngeal mucous membrane allows retching, which helps to keep the blood out of the larynx. In such a field and under such conditions, the internal pterygoid muscle is well contracted, making it easier to engage the tonsil in the guillotine prior to enucleation. This latter fact presents a distinct advantage to the surgeon over other types of anesthesia. It is also of interest to note that hemorrhage is less marked with the use of nitrous oxide anesthesia than with ether or ethylene.

Since the aspiration of infected material is practically impossible with the use of this technique, the danger of lung abscess is much less than when ether or local anesthesia is used. We find that it takes an average of from one to two minutes to anesthetize a child or an adult. By means of the Sluder technique, it is possible to enucleate both tonsils and remove adenoids in less than ninety seconds. If it is necessary for a secondary administration of an anesthetic, we feel that nitrous oxide-oxygen is not contraindicated. At the completion of the surgical procedure, the patient, completely conscious, is turned on his side and is able to expectorate upon command or at will. There is not any

post-operative nausea or vomiting.

The technique we use is as follows: The patient is placed in the dorsal position, with the head in a straight line with the body. We use no restraining straps, but the arms are held on either side of the body at the wrists, with the palms upward so that there can be no movement of the shoulders. The anesthetic is started after the mouth gag is in place, partially open, so that respiration is unembarrassed. As the anesthesia progresses, the gag is opened to its full capacity so that there is no time lost after the mask is removed and the operation started. The anesthetic is continued until the conjunctival and corneal reflexes are lost. The pupils are dilated and the eyeballs turn inward and upward and become fixed.

In order to make this operation successful there must be complete cooperation between the surgeon and the anesthetist because time is an important factor. Of course, when the same two people are working together all the time, it becomes comparatively simple to develop a technique.

In conclusion, may I add that we have used ethylene in forty to fifty cases for this operation and find it has no advantages over nitrous oxide, but on the contrary has disadvantages somewhat resembling those of ether in that it provides too great a degree of relaxation and the bleeding is increased. For the administration of this particular anesthesia I prefer a gas machine which allows positive pressure to be maintained at all times, because there is considerable leakage around the mask with the mouth gag in place, which makes it difficult to keep the breathing bag sufficiently inflated.

PSYCHOLOGY IN ANESTHESIA

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One morning a young man whom for convenience we shall call Joe Gardner, was placed on the operating room table. The surgeon requested that the anesthetic should not be started until the injured arm had been prepared. What to say to the patient during this period seemed to worry the student anesthetist. She knew it would depend upon her own good judgment to introduce pleasant and diverting topics of conversation. After gaining her patient's confidence she learned that he was interested in travel, but because of ill health had had little opportunity for this type of enjoyment. There are many people in Joe's circumstances, unable to leave home, but they will enjoy hearing you tell about the small town hid away in the mountains, or about the deepest river in the world, et cetera. You do not necessarily have to visit these places—good books will add quality and interest to the conversation.

If your patient is a child, find out what he is most interested in at the moment. If you gain his confidence it will not be long before he will tell you all about his wagon, top, or train. Some patients will insist upon talking about the operation which is about to be performed. Reassure them in a kind and sympathetic manner that everything will be done for their comfort, and that they will enjoy much

better health in the future as a result of the operation.

It is not alone the wise selection of words that shows charm, and power to please and convince, but such things as proper pronunciation, intonation and modulation are factors that produce admirable results. Anyone can cultivate a pleasant, well-modulated tone of voice. This may be done by training one's self to speak slowly, carefully and quietly. Well-bred people never raise their voices, even in anger, for the low, gentle voice has become an instinctive part of their personality. On the contrary, savage peoples are found raising their voices to a high pitch to express their likes and dislikes.

It may be difficult at first for the student anesthetist to cultivate a pleasant, expressive manner of speech. The tension of the new work is frequently responsible for an anxious attitude of mind and excessive muscle contraction. When the muscles of the mouth and throat contract the air passages partially close, resulting in a shrill voice. One way to relax these muscles is to breathe deeply, forcing the tension down to the diaphragm. It is necessary to learn to relax, at the same time keeping the mind alert, but calm. When the student has learned to attain ease, her voice will become modulated and gentle, and the jerky movements of all muscles will become accurate and graceful.

The student anesthetist should compare her capabilities and limitations with those of the doctors and nurses in the operating room. She should learn to work in accordance with other people's habits instead of at variance with them, thus developing tolerance and patience. She should observe the response to what she says and does and eliminate, if possible, the expressions and acts that do not bring forth cheerful cooperation.

By taking an interest in others she will acquire cheerfulness. The gloomy anesthetist is usually the one who thinks only of her own advantage, and disregards the happiness of her fellow workers. She is the one who "talks back to the surgeon." She has failed to learn that happy adjustments are never made in the operating room by antagonistic responses. The oldest striving of mankind has always been for cooperation with their fellow men in all their endeavors; in this way the race has made progress. It was because men learned to cooperate that great discoveries were made in alleviating human suffering. It is the individual who is not interested in his fellow men who has the greatest difficulties in life, and inflicts the greatest injury upon others. There is no need to criticize and undervalue members of the hospital personnel—others are not interested in your grievances.

The nurse who takes the course in anesthesia is usually extremely ambitious. She is being trained to think of other people, and to take precautions to secure their safety, comfort and ultimate well-being. May she always be loyal to so honorable a profession, and may she always experience a certain satisfaction in exerting the special skills that have been developed in this branch of service.

ELIMINATING UNNECESSARY HAZARDS*

Every once in a while sensational articles appear in the daily press covering an explosion or fire with consequent destruction of property, and

sometimes personal injury, due to the careless handling of the anesthetic gases and oxygen.

A more recent one was a newspaper article describing a series of terrific explosions from anesthetic gas tanks, followed by a fire, in a southern hospital. The explosion occurred, according to the newspaper article, while an orderly was transferring anesthetic gas from large tanks into smaller cylinders.

In spite of every care which the manufacturers of anesthetic gases take in making the tanks, valves, and other equipment foolproof, and in spite of repeated warnings as to the hazards accompanying careless handling of these containers by inexperienced persons, some of our hospitals pay so little attention to these warnings that occasional explosions occur.

The practice of transferring gases from a larger cylinder to a small cylinder is neither safe nor economical under usual operating conditions, and there is always the hazard of explosions during the process of this transfer. The attention of the hospital should be directed to the ordinary precautions which should be taken in the handling of anesthetic and other explosive gases which they use; this particularly applies to the transfer of these gases from larger to smaller containers. The precautions are listed below:

"(1) The procedure at best is highly hazardous (for opinions on this subject consult any qualified gas engineer, The Underwriters Laboratories of Chicago, the Bureau of Standards at Washington, or the Compressed Gas Manufacturers' Association in New York). Handling a gas under 2000 pounds pressure to the square inch is nothing to be dabbled in, particularly a gas that with oil and grease present could produce a serious explosion.

"(2) Such a process in your hospital would raise both your liability and fire insurance rates. If you doubt that statement consult your local insurance agent or his headquarters.

"(3) The system, even were it safe, is uneconomical for several reasons: in the first place the pressure of a full small cylinder is just as high as that in the large cylinder, so that after filling one or two small cylinders from a large one there is not sufficient pressure left to fill a small cylinder more than part way, and frequent fillings and changes of cylinders are therefore necessary. Then again, considerable quantities of oxygen are lost each time a cylinder is filled in the transfer apparatus itself.

"(4) Unless you own all of your small cylinders legal complications are invited, the same as apply to compressed gas manufacturers themselves who are not permitted to refill cylinders that they or their customers do not own, this for safety reasons and to fix responsibility.

"(5) The process is not as simple as it sounds, as great care must be exercised in the cleaning and preparation of the cylinders, as hang-over gas and other residues cause trouble. Often anesthetic gas cylinders can very easily get mixed up with oxygen, and the resultant mixture would be anything but sweet to take, not to speak of explosion possibilities.

"(6) Again, repair parts for the valves must be kept and used correctly when necessary, a detail without which no oxygen from any source would give satisfaction. Under Federal regulations compressed gas cylinders must be tested at specific intervals for safety purposes, and the

* Reprinted by permission, from "Hospitals," March, 1936.

cheapest oxygen in the world, if safe to use, in an unsafe cylinder is a hazard no hospital should invite.

"(7) In the case of a hospital transferring its own oxygen into small cylinders, that are used with anesthetic gases furnished by a gas manufacturer, should any anesthetic difficulty arise, the hospital would have an unnecessarily hard time in fixing responsibility, because in such a combination of gases, the hospital preparing one of them, would place the institution in the position of proceeding against itself in the event of any difficulty.

"(8) And were such a process safe, sound, or reasonable, which we claim it is not without rigid and expensive precautions, do not overlook the fact that those interested in real economy should begin on the items that represent volume purchases in a hospital, not merely an incidental, as is the case with oxygen, as pointed out above."

A careful study of gas explosions in hospitals invariably portrays a break in the recognized technique for handling the cylinders, or in the transfer of gases from one container to the other. It would be much better to purchase these gases in suitable size containers and avoid the necessity of transfer. The increase in the cost of these smaller containers for such use would be but a small portion of any resulting damage to property or injury to person due to explosion.

The increase in your fire insurance premium alone, in a single year, would amount to more than the additional cost of the smaller cylinders which you might use for two or three years. This is but a small item in comparison with the hazards that the patients and the persons working in the operating or the anesthetic room are subjected to in following this practice.

ANESTHESIA SECTION OF HOSPITAL STANDARDIZATION CONFERENCE

Philadelphia, Pa.,

At the annual convention of the American College of Surgeons held in Philadelphia, Miss Hilda Salomon, President of the National Association of Nurse Anesthetists, appeared on the program of the Hospital Standardization Conference on Thursday, October 22nd. The hall was filled to capacity with many distinguished members of this section and the program was conducted by Dr. Robert Buerki and Mr. Robert Jolly.

The following questions were submitted to Miss Salomon and were answered as follows.

Question 1.—What are the essentials of an anesthesia department in a hospital as recommended by the American College of Surgeons?

Answer.—It is essential that every anesthesia department be headed by a physician, whose responsibilities as such assure the checking of the condition of the patient pre-anesthesia, with special attention to the heart, lungs and kidneys. It should be his duty to provide for the instruction of the internes in the administration of spinal, caudal, intravenous or any special procedure which requires surgical technique. It is important that monthly conferences be conducted by

the physician in charge of the department so that mortalities, errors in judgment or technique and especially difficult cases, may be discussed. Working with this physician should be an adequate staff of graduate nurse anesthetists. These nurse anesthetists should not merely know how to "pour ether," but should be graduates of recognized Schools of Anesthesia where they have been taught anesthesia from a theoretical as well as a practical standpoint. The nurse anesthetist is valuable in that the department is covered at all times, thereby giving to the hospitals efficient twenty-four hour service.

Question 2.—If it is necessary for an anesthetist to share her services, what duties combine most satisfactorily?

Answer.—It is poor policy for an anesthetist to have to combine duties. She may be in the midst of some special nursing treatment when she is called to the operating room for an emergency anesthetic. Should she leave her patient in the midst of the treatment she is criticized by the nursing department for neglecting the patient. If she is late in arriving for the operation the surgeon is none too happy. There are, however, many small institutions where a combination of duties is necessary. In such instances it is more advisable for the anesthetist to assist in the department of X-ray, laboratory, registrar's office or the medical library of the hospital, but *not* the nursing department.

Question 3.—For what post-operative period should an anesthetist check on the patient's condition after his or her return to the ward?

Answer. — Anesthetists should be required to visit the patients post-operatively twice within the first twenty-four hours, then daily thereafter for one week. Any complications occurring after that period could hardly be attributed to the anesthesia. These visits are made of course with the sanction of and in cooperation with the surgeon.

Question 4.—Should a nurse anesthetist be present when spinal anesthesia is being administered?

Answer.—Yes, she certainly should, because these patients require constant watching, with frequent checking of blood pressure, and it is often necessary to supplement the spinal with a general anesthesia. In such cases an anesthetist is always present and there is no time lost. When a nurse anesthetist remains constantly with a spinal anesthesia case she gains the patient's confidence by the continuous administration of "vocal anesthesia," thereby allaying fear.

I regret that the limited time allotted necessitates that my remarks be very brief.

REPORT OF PUBLIC RELATIONS COMMITTEE*

This report presents a summary of the activities of the Committee on Public Relations for the year ending October, 1936. In regard to legislative problems which came up during the year, practically all, with the exception of California, are still pending, and information herein given must be regarded as tentative rather than decisive.

* Read at the annual meeting of the National Association of Nurse Anesthetists, Cleveland, Ohio, September 30th, 1936.

California

The case of Chalmers-Francis versus Dagmar Nelson, which has been before the courts of California since 1934, was brought before the State Supreme Court. This Court affirmed the decision of the Superior Court in every particular, holding that "nurses in surgery during preparation for and progress of an operation are not diagnosing or prescribing within the meaning of the Medical Practice Act. We are led further to accept this practice and procedure as established when we consider evidence of the many surgeons who supported the contention of the defendant nurse and whose qualifications to testify concerning the practice of medicine in this community and elsewhere were established beyond dispute. That such practice is in accord with the generally accepted rule is borne out by the decided cases." (Unquote)

The importance of this favorable decision, in relation to nurse anesthetist service, can hardly now be estimated in terms of future security to the progress of the work.

New York

The Erie County Medical Society passed a resolution against nurse anesthetist service, the matter, as yet, not progressing beyond this stage.

The Industrial Commission of New York decided the administration of an anesthetic is the practice of medicine; such a decision should not be interpreted as carrying legal authority, but rather regarded as an unusual attitude, which this Committee hopes the Commission will later modify.

Pennsylvania

A report that the Philadelphia County Medical Society were seeking to discuss with the Attorney General of Pennsylvania, the status of the nurse anesthetist, proved on our making contact with the Attorney General, to have no foundation in fact. While nurse anesthetists were refused admission to a certain hospital and barred from lectures and clinics controlled by medical anesthetists of Philadelphia; the convention of the Pennsylvania State Association of Nurse Anesthetists, held in May, gave a feeling of encouragement, in regard to alert watchfulness and determination to promote constructive efforts in overcoming this opposition.

Missouri

The possibility of a bill to be presented in January, 1937, adversely affecting nurse anesthetists, was brought to the attention of the Committee. In this connection plans have been set in motion by the Missouri State Association of Nurse Anesthetists in cooperation with the National Association, for keeping the situation well covered.

The Tennessee Association of Nurse Anesthetists met in February. Miss Hodgins, then in the South, appointed pro tem member of this Committee, reported the successful meeting of their problems by the officers of this Association and the smooth functioning of this important Southern division.

The question regarding the necessity of a registered nurse becoming registered in the state in which she is practicing, while maintaining registration in another state, came up for consideration. This committee referred the question to the American Nurses' Association as to implication of "whether or not it is necessary for nurse anesthetists to be registered in the state in which they are engaged as anesthetists." Miss Susan C. Francis, President of the American Nurses' Association, courteously gave

an opinion, which will be passed on to the Educational Committee. It is the belief of this committee that the broad question involved will be most satisfactorily investigated and studied by the Educational Committee; the Public Relations Committee collaborating as indicated, on the legislative aspects.

The question of affiliation with the Federation of Women's Clubs, referred to this committee at the last convention, was carefully studied, and recommendation is now made to give the matter still further consideration, before making a decision.

The committee is happy to report that the American College of Surgeons, which meets in Philadelphia in October, have asked Miss Salomon, representing the National Association of Nurse Anesthetists, to take part in a panel discussion on Anesthesia. The Congress of Medical Anesthetists meeting at the same time and place, makes this request the more significant.

This committee wishes to endorse the recommendations made in the 1935 report of the Public Relations Committee, in regard to grouping the states into divisions and increasing the number of members on this committee, so that each division will be represented; thus facilitating cooperation between states and National Headquarters on problems relative to our public relations.

It is also urged that State Associations, seeking affiliation with the National Association, investigate the eligibility of all their members to become members of the National Association of Nurse Anesthetists, before making application for State Association membership.

In conclusion the committee wishes to extend thanks to the National officers and legal counselor for their splendid cooperation.

Respectfully submitted,

MARIAN L. ROBINSON, Chairman
LOU E. ADAMS
CORA MCKAY
JEAN O'BRIEN
MYRA B. QUARLES
ANNA WILLENBORG

ACTIVITIES OF THE STATE ORGANIZATIONS

COLORADO

A meeting was called on June 6th, 1936, at St. Joseph's Hospital, Denver, Colorado, for the purpose of organizing the nurse anesthetists in that state. Fifteen members were present and the following officers were elected:

President
May Marcom Carpenter
2370 Ash St., Denver, Colo.
First Vice-President
Ethel Currie
1819 Gilpin St., Denver, Colo.
Second Vice-President
Margaret Kramer
Corwin Hospital, Pueblo, Colo.
Secretary-Treasurer
Sadie Louise Heckert
3327 W. 29th Ave., Denver, Colo.

On October 24th, 1936, a meeting was held at Children's Hospital and constitution and by-laws drafted for submisstion to the National Association.

MISSISSIPPI

The Mississippi Association of Nurse Anesthetists will meet in Meridian, Miss., May 12th, 1937. For further information address Miss Emma Easterling, President, Vicksburg Hos-

pital, Vicksburg, Miss., or Miss Lola Allen, 515 Arnold, Greenville, Miss.

MISSOURI

A social gathering of the St. Louis members was held at Jewish Hospital, St. Louis, on Friday, November 13th, and a benefit card party was held at St. John's Hospital on December 4th. In each instance there was a large attendance. The proceeds of the card party, amounting to $71.80, was turned over to the Treasurer of the Missouri Association.

The date of the annual convention of the Missouri Nurse Anesthetists' Association will be decided at the next meeting of the Board of Trustees of the Missouri Association, which will be held early in 1937.

NEBRASKA

Meetings will be held every other month until it is possible to have a state convention. The next meeting will be held February 15th, 1937, at St. Catherine's Hospital, Omaha, Nebr.

It is encouraging to note that since September, 1936, at which time the Nebraska organization was started, with a nucleus of seven members, the membership has increased almost 300 per cent and to date totals 23 active and 3 associate.

OHIO

The fourth annual meeting of the Ohio Association of Nurse Anesthetists will be held at the Deshler-Wallick Hotel, Columbus, Ohio, April 14th and 15th, 1937.

For further information write Miss Lucy E. Richards, President, City Hospital, Cleveland, Ohio, or Miss Marian Hollister, Secretary-Treasurer, Maternity Division, University Hospitals, Cleveland, Ohio.

PENNSYLVANIA

The sixth annual meeting of the Pennsylvania Association will be held at Buck Hill Falls, Penna., June 2nd, 3rd, and 4th, 1937. Details in regard to the program will be published in the May issue of the National Bulletin.

Twenty-three anesthetists were present at the bi-monthly meeting in Philadelphia December 14th. Dr. Bower talked on spinal anesthesia.

TENNESSEE

The annual meeting of the Tennessee Association of Nurse Anesthetists will be held February 18th, 1937, at the Hotel Peabody, Memphis, Tenn., following the Mid-South Post-Graduate Nurse Anesthetist Assembly to be held on February 17th and 18th at the Hotel Peabody.

Miss Agatha C. Hodgins, Honorary President of the National Association of Nurse Anesthetists, has accepted an invitation to attend the Tennessee meeting, and the program will include outstanding doctors and anesthetists from several states. The banquet, with dancing following, will be held on February 17th at the Hotel Peabody.

All nurse anesthetists in good standing in the National and State Associations are invited to attend.

TEXAS

The Fort Worth Association of Nurse Anesthetists resumed monthly meetings in September with apparently even more enthusiasm and interest than previously. Officers elected for the year:

President
Minnie V. Haas,
Methodist Hospital, Fort Worth, Texas

Vice-President
Gertrude Smith,
1029 Shaw Street, Fort Worth, Texas

Secretary-Treasurer
Alva Greene,

All Saints Hospital, Fort Worth, Texas

The educational program of the past year, in charge of Dorothy M. Hoadley, included several interesting talks given by outstanding medical men, and a motion picture was presented on "Modern Methods of Anesthesia." Miss Allie Mae Campbell, Cook Memorial Hospital, presented a paper on "A Technique for Administering Ether and Air," also a short article on "Coagulation Time in Ethylene Anesthesia" and in January a report on the use of evipal in the Methodist Hospital, Fort Worth, will be given.

The Fort Worth group feels that they derive great benefit by meeting to discuss their common problems, and the study required in preparing their programs and papers has been a stimulus to them. The Program Committee with Gertrude Smith as Chairman, is planning a program which will include several papers of interest to be presented by the members of the Association.

The second annual meeting of the Texas Association of Nurse Anesthetists will be held April 28th, 1937, in conjunction with the Texas Hospital Association, in Lubbock, Texas. For further information write Miss Dorothy M. Hoadley, President, Methodist Hospital, Fort Worth, Texas, or Miss Ora Lee Mercer, Secretary-Treasurer, 207 Medical Arts Bldg., Fort Worth, Texas.

VIRGINIA

The second annual meeting of the Virginia Nurse Anesthetists Association was held in Richmond, Virginia, November 28th, 1936. The following members were present:

Mrs. Edna Nesbit Beal
Miss Vera C. Copeland
Mrs. Julian B. Doss
Miss Nancy J. Forgie
Miss C. Virginia Godbey
Miss Lorane Lisle
Miss Eunice Marberry
Mrs. Minnie Freese Payne
Miss Georgia Cabell Scott
Miss Virginia S. Supinger

The following officers were elected for the year 1937:

President
Miss C. Virginia Godbey
Norfolk Protestant Hospital, Norfolk, Va.

Vice-President
Miss Ollie May Addleman
Cabaniss Hall, Richmond, Va.

Secretary-Treasurer
Mrs. Edna Nesbit Beal,
Cabaniss Hall, Richmond, Va.

Trustees:

3-year Miss Eunice B. Marberry, Jefferson Hospital, Roanoke, Va.

2-year Miss Lorane Lisle, Stuart Circle Hospital, Richmond, Va.

1-year Miss Georgia Scott, Lewis-Gale Hospital, Roanoke, Va.

The meeting was followed by a dinner and a delightful social hour. It was gratifying that so large a percentage of the membership of the Virginia Association was present.

The fifth annual meeting of the National Association of Nurse Anesthetists will be held in Atlantic City, N. J., September 13th to 17th, 1937, in conjunction with the American Hospital Association. Convention headquarters will be located at the Ritz-Carlton Hotel, Atlantic City.

Further particulars in regard to the program and arrangements will be published in the May issue of the Bulletin.

FEBRUARY 1st, 1937

Word has just been received that the meeting of the Mid-South Post Graduate Assembly in Memphis, Tennessee, has been cancelled due to flood conditions.

NOTICE

Anesthetists who will be available for relief positions during the summer will please file qualifications and recommendations at headquarters. Anesthetists will be chosen for popsitions in the order in which their names appear on the list from the locality in which the position is located.

OFFICERS

1936-37

Honorary President—Agatha C. Hodgins

President—Hilda R. Salomon

First Vice-President—Verna M. Rice

Second Vice-President—Olive L. Berger

Third Vice-President—Eva M. Dickson

Treasurer—Gertrude L. Fife

Trustees

Gertrude L. Fife
Agatha C. Hodgins
Helen Lamb
Verna M. Rice
Miriam G. Shupp
Hilda R. Salomon
Anna Willenborg
Clara A. Wurtz

A MATTER OF POLICY—

Inasmuch as there now exists a plethora of fully trained and competent anesthetists, graduates of the various recognized anesthesia schools, and as the art of anesthesia has developed to a point that now makes possible many surgical procedures that formerly were attempted only in extremis, we feel that the practical performance can no longer be intrusted to anyone but a specialist experienced and trained in the latest methods.

We do not advocate the use of our apparatus with Cyclopropane and the Carbon Dioxide Absorption Method, or closed endo-tracheal anesthesia with catheter and balloon, unless we know that the operator of the machine is fundamentally prepared to handle the proposition.

We solicit the support of the surgeon, and anesthetist as well as the superintendent in our earnest endeavor towards the establishment of wholesome and progressive conditions in the performance of anesthesia. We believe that our stand against carelessness and ignorance deserves support.

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